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Organic Light Emitting Diode (PI2013700871)

Figure 3 : Emitting superior brightness during the demonstration

Since the discovery of organic light emitting device (OLED) by Tang and Van Slyke, OLED holds great potential for flat panel display and solid state lightings. It is mercury free and its emission is diffused and most interestingly it can be printed like a newspaper. The team at University Malaya uses organic semiconductor materials as an emissive layer. Such layer is usually less than 100nm. There are two approaches to fabrication. One approach is to use vacuum deposition of organic materials and the other is by using solution processing. Vacuum deposition of organic material involves very high cost. Our research in the University of Malaya focuses on solution processability. This means that it can be printed like a sheet of paper on a flexible substrate at a low temperature. This process also incurs a very low manufacturing cost. Coupled with a frontier understanding of material physics, organic chemistry and innovative optimization of materials, layers, processes and cathode, solution processed OLED can be highly efficient. In the patent, we used the solution processable multilayer organic light emitting diode. This was achieved by combining the orthogonal solvents and crosslinkable interlayer to form multilayer OLED that enables efficient charge and high triplet confinement. Such a device could potentially replace the existing application of LED. Solution processed OLED is the next generation green technology which can be used in transparent displays, signages and eventually general lighting of large area. It is ultra thin, biodegradable, can be fabricated at low cost and delivers high performance without the need of heat-sinking. The OLED also offers a more environmentally friendly approach to the use light. Currently, we are engaging with the Malaysian LED industry to bring this technology to the pre-commercialization stage and eventually to be used in signages and in general lighting.

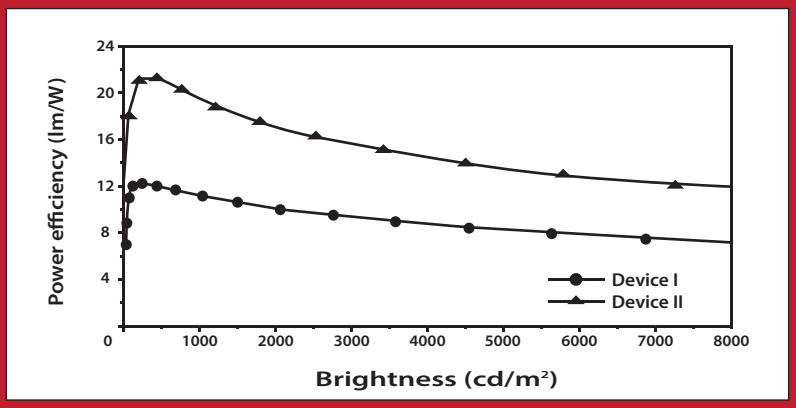

Figure 1 : A comparison of brightness and power efficiency between the OLED and the common LED

Figure 2 : The OLED uses an organic semiconductor material as an emissive layer

Figure 4 : OLED illuminates a dark surrounding.

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Bio-Impedance Analyzer Diagnostic Tool
(PI 2013 700936)

Figure 3 : A non invasive bioimpedance analysis.

The invention can be described as a portable general-purpose bio-impedance analyzer for medical diagnosis. Bio-impedance represents the response of a living body tissue to an externally applied electric current and consists of resistance and reactance components. In biological tissues, resistance arises from extra and intra-cellular fluids whereas capacitive reactance arises from cellular membranes. The measurement of bio-impedance is conducted by passing a sub micro-ampere sine wave current signal through human body and the output of the measurement displays bio-impedance parameters, namely, resistance, reactance and phase angle.

Bio-impedance analysis offers a noninvasive and real-time method to monitor human body tissues and hence is useful in various clinical applications. The usability of bio-impedance analysis has been demonstrated in multitude of clinical applications ranging from tumor monitoring, detection of tissue ischemia, non-invasive continuous blood glucose monitoring, and diagnosis and monitoring of lymphedema to assessment of human body composition. However, its clinical potential is curbed by the lack of cost-effective portable and wearable general-purpose bio-impedance analyzer in the market.

Our current bio-impedance analyzer diagnostic tool, shown in Figure 1, is a general-purpose device that is able to provide bio-impedance analysis. This analyzer is portable, rapid, low-cost, locally made and can be easily customized for specific disease monitoring. Hence, this invention opens a new avenue for the widespread clinical applications of bio-impedance analysis. Our team, for example, is currently developing a wearable non-invasive bio-impedance monitoring device for classifying risk in dengue patients. This new device will provide human body composition information namely water compartments and mass distribution, and will incorporate Artificial Intelligence algorithms for clinical decision support system. In this future prototype, the data will be transferred wirelessly via Bluetooth. Computerized data analysis could then be performed remotely in clinician's mobile application for a particular disease, as envisioned in Figure 2.

Figure 1 : Performing an analysis via the clinicians mobile applications.

Figure 2 : The Bioimpedance Analyzer, which has been recently granted its patent.

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